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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,688	12/16/2003	Masayuki Endo	60188-730	3573

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EXAMINER

SULLIVAN, CALEEN O

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 10/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/735,688

Applicant(s)

ENDO ET AL.

Examiner

Caleen O. Sullivan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 12-16-03, 10-18-05
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: Reference No. 32 in Figure 3B is not mentioned in the description. Appropriate correction is required.

Information Disclosure Statement

2. It is noted that Reference CN 1263612 listed in IDS dated, 10-18-2005 corresponds to Reference US 6,479,210 listed in the same IDS. However, Reference CN 1263612 cannot be considered because an English translation of this reference was not provided.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 19 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 19 is stated as depending from claim 15. However, because the language of Claim 15 is the same as claim 19 Examiner has interpreted that Claim 19 depends from Claim 16. Examiner has used this interpretation in the claim rejections that follow. Correction is required stating the proper claim from which Claim 19 depends.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claims 1-5 and 9-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura ('288) in view of Grabowski ('548).

Nishimura ('288) discloses a pattern formation method where a resist film is formed from a chemically amplified resist material, which is developed after being irradiated with light. (See col. 3, 60-63; col. 13, 67- col. 14, 1; col. 14, 16-18 and 33-38.) Nishimura ('288) also discloses that the thickness in the unexposed portion of the resist film only changes by 100-400 Angstroms after development of the photoresist film layer (See, col.14, 21-23; col. 15, 34-49). Utilizing the example of a photoresist film with an initial thickness of .7 micrometers a decrease in only 100-400 Angstroms, after the film is developed, would be a percent change of 1.5 to 5.7 in the thickness of the photoresist film (See col. 15, 34-39; Col. 15, 50-67 to col. 16,1; col. 16, 44-51). This reduction in resist film thickness achieved with the method disclosed in Nishimura ('288) overlaps with the thickness reduction ratio for the resist pattern recited in claim 1.

Nishimura ('288) also discloses that the chemically amplified photoresist utilized in the pattern formation being described is positive, as recited in claims 2, 10, 16 and 20. (See, Abstract; col. 2, 23-33). Nishimura ('288) also gives examples of compositions for the photoresist film where a polymer in the resist material having a protecting group is present in the resist material composition at a mole % that is greater than 50%, which is within the limitation recited in claim 2,

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where the resist material has a protection ratio of 50% or more. Nishimura ('288) also discloses protecting groups, also referred to as acid dissociable groups, which could be attached to the polymer comprising the resist material, such as t-butyl group, which is recited in claim 3. (See col. 4, 16-18; 42-48).

Nishimura ('288) also discloses a chemically amplified resist that includes an onium salt as an acid generator. (See, col. 7, 43-48). Nishimura ('288) gives examples of acid generating agents including diphenyliodonium trifluoromethanesulfonate, triphenylsulfonium nonafluorobutanesulfonate, and triphenylsulfonium trifluoromethanesulfonate, which are recited in claim 4. (See col. 7, 67; col. 8, 7-9).

Nishimura ('288) also describes various types of radiation that can be used in the pattern formation method including ArF or KrF excimer laser, which are recited in claims 9, 15, 19 and 22. (See col. 14, 1-9).

Nishimura ('288) also teaches chemically amplified resist materials which are composed of resins that upon irradiation with light will generate a carboxylic acid such as acrylic acid, as recited in claims 10-11 and 14. (See col. 3, 1-9).

Nishimura ('288) also discloses a chemically amplified resist material that may include other mono-functional monomers including acids such as acrylic acid, which is recited in claims 20 and 21. (See col. 4, 49-53 and 57-67).

Nishimura ('288) also teaches that the other mono-functional monomers, which may comprise the chemically amplified resist material includes acrylates. (See col. 5, 15-18). In the specification applicant teaches that acrylates can function as dissolution inhibitors in the resist material. (See, Specification page 18, 9-16). Although, Nishimura ('288) does not refer to acrylates as dissolution inhibitors, it is inherent acrylates can function as dissolution inhibitors. Therefore,

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Nishimura discloses a chemically amplified resist material that includes dissolution inhibitors for generating carboxylic acids such as acrylic acid when irradiated with light, as recited in claims 12-13 and 16-18.

However, Nishimura ('288) fails to disclose the limitation of claims 1, 10, 16 and 20 where the light component from the irradiation source enters the resist film at the Brewster's Angle.

Grabowski ('548) does disclose directing a beam of light at a preferred angle of incidence, which results in a maximum transmission of the light into a photosensitive layer; this preferred angle of incidence being the Brewster's Angle. (See, abstract and col.3, 65- col.4, 41). This disclosure teaches the limitation recited in claims 1, 10, 16 and 20 where the resist film is irradiated with light having a component entering the resist film at the Brewster's Angle.

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the pattern formation method disclosed in Nishimura ('288) with the irradiation step disclosed in Grabowski ('548) in order to reduce variations in the thickness of a photosensitive layer, because exposing a photosensitive layer at the Brewster's Angle results in maximum transmission of light into the photosensitive layer.

6. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura ('288) in view of Grabowski ('548) as applied to claims 1-5 and 9-22 above, and further in view of Lee ('644).

Nishimura ('288) and Grabowski ('548) are relied upon as discussed in the rejection of Claims 1-5 and 9-22 set forth above in paragraph 5.

Nishimura ('288) and Grabowski ('548) fail to disclose the limitations of claims 6-8 where an insoluble layer is formed in a surface portion of the resist film, which is insoluble in developer and is formed by supplying an alkaline aqueous solution on the resist film. The alkaline aqueous solution is

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either a tetramethylammonium hydroxide, a tetraethylammoniumhydroxide or a tetra-n-butylammonium hydroxide aqueous solution.

Lee ('644) discloses a pattern formation method where a chemically amplified photoresist composition is coated on a substrate, is contacted with an alkaline solution, is exposed to light and then is developed. (See col. 2, 54-64). This disclosure teaches the limitations recited in claims 6-8, where as part of a pattern formation method a layer that is insoluble in developer is formed on the surface of the resist film, after the resist film is formed, but before the resist pattern is formed; and the insoluble layer is an alkaline aqueous solution of either tetramethylammonium hydroxide, tetraethylammoniumhydroxide or tetra-n-butylammonium hydroxide.

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the pattern formation method disclosed in Nishimura ('288) with the teachings of Lee ('644), because contacting the photoresist film with an alkaline solution prior to exposure and development of the resist pattern prevents the acids generated by the exposure, upon which pattern formation depends, from being neutralized by amine compounds present in the atmosphere; therefore, resulting in good pattern formation on the photoresist film.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caleen O. Sullivan whose telephone number is 571-272-6569. The examiner can normally be reached on 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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10-24-06

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